CDMS POWER SUPPLY: Users Manual

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Chassis Description
The CDMS Power Supply contains 7 individual power supplies, four 15 Volt/15Amp supplies, one 15V/3A supply, one 5V/6A supply and one triple output supply of +/-15V and +5V. The supplies are arranged in the following configurations and used for the listed purpose:

- +/- 15V, Front End Electronics (FE) (two 15V/15A supplies).
- +/- 15V, Analog Electronics (two 15V/15A supplies).
- +15V, Heater (15V/3A supply)
- +5V, Digital Electronics (5V/6A supply)
- triple output supply, CDMS Power Supply chassis electronics supply

Power Controls.
There are two power switches on the front panel used for controlling the AC and DC powers. They are the AC POWER switch (rocker switch, SPST) and the DC POWER switch (toggle switch with an 'ON' position and a momentary toggle position, DPDT).

The AC POWER switch turns the fused AC Power on and off to the chassis. When the switch is turned ON, AC power is immediately provided to the Heater Power supply, to the DC POWER switch and to a buss where the power is fanned out to the remaining power supplies. When the DC Power switch is moved to the 'ON' position, AC power is supplied to the chassis power supply.

All of the supplies are fused as per manufacturer specifications.

DC POWER switch.

- The first purpose of the switch is to turn on the Chassis Electronics supply which provides power to the Monitor and Power Supple Sequencer board and the Display board. This section of the switch has a DPST action (ON/OFF).
- The second purpose of the switch is to initiate the start up sequence of the power supplies used by the electronics crate. This section of the switch has a momentarily closed position which initiates the start up sequence.
- This is a three position switch: OFF-ON-MOMENTARY(ON SEQUENCE INITIATE). Movement of the switch from the 'OFF' position to the 'ON' position connects AC power to the chassis power supply and the boards are powered up. In both the 'ON' and 'ON SEQUENCE INITIATE' positions AC power is maintained on. Movement of the switch to the 'ON SEQUENCE INITIATE' initiates the electronics crate power supplies turn on sequence. Each time the switch is moved to the 'ON SEQUENCE INITIATE' a power on sequence is initiated, if the power supplies are already 'ON' this will have no effect on their present state.

Turning the power supplies 'OFF'. The electronics crate's power supplies can be turned 'OFF' by moving the DC POWER switch to the 'OFF' position or by turning the AC POWER switch 'OFF'. Using the DC POWER switch will only shut 'OFF' the electronics power supplies while leaving the Heater Supply 'ON', moving the switch back to the 'ON' position will enable the display output.

The **Chassis Electronics** is composed of two PC boards: the Monitoring and Power Supply Sequencer board and the Power Supply Display board. A description of each section follows.

Power Supplies Display
This board uses 10 segment LED bar graphs to provide a visual representation of the voltage and current of each power supply as measured at the back plane of the electronics crate. There are also test points on the front panel that can be used to measure the output voltage of each supply using an external meter.

The voltage displays are calibrated so that the center LED equals the rated output voltage of the supply and has a range of + and - 0.25V around that value. In some instances two LEDs may be lit, this is the result of the built in hysteresis of the Display Driver.
The current displays monitor the current output of each supply and are calibrated so that the current rating of each supply equals 75% of the display's range. This provides an additional range of travel so that overloads of a supply can be observed. Each of the displays individual LEDs has a different value of represented current dependent upon the rating of the power supply being monitored.

Voltage Monitor Output Jacks and Selector Switch.
The Voltage Monitor output consists of 2 tests jacks on the front panel where the voltage outputs of each supply can be measured. A front panel selector switch is used to select the supply that is to be measured. The measured value is the output voltage of the tested supply as measured at the backplane of the electronics crate.

Monitoring and Power Supply Sequencer
This board has two sections, the monitoring section and the sequencing section.

1. The monitoring section monitors the voltage levels of the individual power supplies at the backplane of the electronics crate. Each of the supplies has its own monitoring circuitry consisting of a window comparator with its associated level inputs. In the instance that any of the voltage levels fall out of the range of + or - 0.25 Volts of the supplies rated output voltage, the monitoring circuitry will turn 'OFF' all of the supplies except the heater supply.
2. The sequencer section turns on the supplies that are used in the electronics crate. It has the capability to start up the 6 supplies in numerous configurations dependent upon the user's requirements. The setup for the various configurations is done via the use of jumpers on the board (a diagram of different jumper configurations is provided, see Appendix A) and Solid State Relays(SSR) mounted in the chassis. There is one SSR for each of the power supplies. In the CDMS power supply there is no SSR for the Heater Supply and it is hard wired 'ON'. Upon initiation of the start up, the sequencer takes the outputs of the individual monitoring circuits and uses their status to turn on the succeeding power supplies dependent upon the jumper configuration. The Sequencer generates pulses with a 1 second cycle time to clock 'ON' the SSRs as the monitoring circuitry for preceding power supplies enables each succeeding step. The circuit design limits the maximum number of pulses to 10, if any of the power supplies output is not up to the specified voltage, at this point all of the power supplies will be shut 'OFF' and the start up sequence is aborted. Once all of the power supplies are operating within the specified range the start sequence is halted and the monitoring section takes control of the SSRs.
3. Two test switches have been added to this board that provide a way to troubleshoot the board.

- Test Switch #1: This switch allows the user to isolate the SSR reset from the monitor circuits. This is used to calibrate or test each of the monitor circuits using the Sense Voltage without having the supplies being turned off during the procedure.
- Test Switch #2: This switch is used to test for specific power supply problems. When set to the test position the summed outputs of the monitor circuits is used clock the SSR controller to turn off any supplies that have drifted out of the specified parameters. Used in conjunction with Test Switch #1 all of the other power supplies remain unaffected by the one power supply being turned off.

Sequencing Jumpers.
The Monitoring and Power Supply Sequencer board has jumpers that can be used to select different start up sequences for the supplies that power the electronics crate. Typical configurations are included in Appendix A. All of the supplies are set up and shipped using configuration #2.